Solid State High Power Amplifier for Communications

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The official link for this solicitation is:
http://www.acq.osd.mil/osbp/sbir/solicitations/sbir20152/index.shtml

Agency:
Department of Defense

Release Date:
April 24, 2015
Branch:
n/a

Open Date:
April 24, 2015
Program / Phase / Year:
SBIR / Phase I / 2015

Application Due Date:
June 24, 2015

Solicitation:
DoD 2015.2 SBIR Solicitation

Close Date:
June 24, 2015
Topic Number:
MDA15-023

Description:

The goal of this topic is to investigate solid state power amplifier (SSPA) technologies that meet or exceed the output power (greater than 1 kW), duty factor, operating frequency (K-band:20-22 GHz), reliability, sustainability, and supportability achievable with existing traveling-wave tube amplifiers as a potential replacement for klystron tubes in future communication systems. Klystron tube technology has reliability and supportability issues resulting from manufacturing processes and component (tungsten wire) availability. The proposed SSPA architecture should consist of a modular design which provides an additive power approach based on multiple radio frequency (RF) modules linked together to achieve desired power while providing for gradual degradation when a single RF module fails so components can be replaced without having to remove input power. Currently, input power must be cut when replacing a failed klystron. SSPA technologies that leverage built-in-tests and diagnostics to provide fault detection and isolation at a line replaceable unit level should be emphasized. This level of fault determination should allow for efficient replacement of failed hardware components and demonstrate enhanced safety for system operators and maintainers. Another goal of this topic is to demonstrate fast SSPA warm-up times (less than a 1 second “warm-up” time prior transmission). Finally, the proposed SSPA technology should demonstrate enhanced availability and reliability to meet operational readiness at minimal cost. PHASE I: The contractor should develop a generic solid state HPA design that provides for future growth potential to support emerging interceptor communications requirements. The design should document expected reliability, availability, sustainability and supportability performance at power levels and duty factors

that are sufficient for communications. PHASE II: The contractor should transition the generic solid state high power amplifier design completed in Phase I into a system specific end item prototype suitable for testing via insertion into an existing missile defense application. The prototype and design documentation should be provided to the government. PHASE III: The contractor should integrate the Phase II prototype into an existing government hardware string and then conduct subsystem and system level testing to ensure compatibility with legacy communication hardware components. The contractor will be expected to refine the design as needed to address any needed changes identified during testing to satisfy communication design/performance requirements. Commercialization: This innovative technology would have benefits for all commercial and/or defense systems applications operating in the X, Ka, K, & Ku bands requiring reliable, sustainable high power amplification of RF energy (e.g. commercial and military satellite communications) but the benefits are also applicable to bands above and below those specific bands. The contractor proposal should clearly explore and identify other specific applications for both commercial and defense systems.